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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Masahiro Harada

2004-2027A

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EXAMINER

YOUNG, NATASHA E

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/522,604	Applicant(s) HARADA ET AL.	
	Examiner NATASHA YOUNG	Art Unit 1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 August 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,4,5 and 8-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,4-5,8-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on August 13, 2008 has been entered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

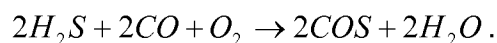
1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein

were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 4-5, and 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Borsboom et al (US 4,981,661) in view of Tang et al (US 6,019,954) and Forg et al (US 5,660,807).

Regarding claim 1, Borsboom et al discloses a COS treatment apparatus for a gasified gas containing H₂S, H₂O, O₂, and CO, which comprises: a first reactor (12) into which the gasified gas is to be introduced, the gas having a temperature of at least 300°C; a second reactor (14) located at a downstream side of a gasified gas flow with respect to the first reactor (12); and wherein the first reactor comprises an O₂ removal catalyst and the second reactor comprises a COS conversion catalyst (see Abstract; figure 1; column 4, lines 37-41; and column 5, lines 28-68), which is capable of accelerating the following reaction:



Borsboom et al does not disclose that said O₂ removal catalyst is a TiO₂ catalyst carrying Cr₂O₃ or NiO.

However, Borsboom et al discloses that the oxygen removal catalyst is Co-Mo catalyst (see column 5, lines 28-68).

Tang et al discloses Co-Mo system catalyst supported over a TiO_2 -containing carrier for the conversion of carbon monoxide with steam into carbon dioxide and hydrogen (see column 1, lines 9-18) and said catalyst comprises a carrier having TiO_2 , at least one catalytically active metal compounds selected from the group consisting of oxides and sulfides of Co, Ni, Mo, and W, and optionally promoters selected from the groups consisting of compounds of rare earth element, alkali earth metals, Cu, Zn, and Mn (see column 2, lines 24-39).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the teachings of Borsboom et al with the teachings of Tang et al such that said O_2 removal catalyst is a TiO_2 catalyst carrying NiO in order to improve the conversion of carbon monoxide with steam into carbon dioxide and hydrogen.

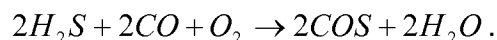
In addition, Forg et al discloses a gas mixture is brought into contact with a catalyst which decomposes HCN by hydrogenation and/or by hydrolysis and COS that is contained in the gas mixture is decomposed at least partially in a catalyst by hydrolysis (see Abstract), a TiO_2 catalyst carrying Cr_2O_3 or NiO (see column 2, lines 32 through column 3, line 5), and simultaneously at least a large part of the COS that is contained in the gas mixture is reacted by hydrolysis, and at the same time the new formation of COS from H_2S and CO_2 is suppressed (see column 2, lines 42-48).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the combined teachings of Borsboom et al and Tang et al such that said O_2 removal catalyst is a TiO_2 catalyst carrying Cr_2O_3 in order that the

catalyst system may be used for the decomposition of HCN by hydrogenation and/or hydrolysis and COS is decomposed at least partially by hydrolysis.

Regarding claim 4, Borsboom et al discloses a COS treatment apparatus wherein said O₂ removal catalyst is located in a higher-temperature region with respect to said COS conversion catalyst (see column 2, lines 39-55).

Regarding claim 5, Borsboom et al discloses a COS treatment method for a gasified gas containing H₂S, H₂O, O₂, and CO, which comprises a first step of removing O₂ and SO₂ to form steam and H₂S and the temperature of the gas supplied to the first step will generally be at least 200°C, and a second step which catalyses the hydrolysis with steam of COS and CS₂ to form carbon dioxide and H₂S at a temperature of at least 275°C (see Abstract; figure 1; column 2, lines 39-55; column 4, lines 37-41; and column 5, lines 28-68), which is capable of accelerating the following reaction:



Borsboom et al does not disclose that said O₂ removal catalyst is a TiO₂ catalyst carrying Cr₂O₃ or NiO.

However, Borsboom et al discloses that the oxygen removal catalyst is Co-Mo catalyst (see column 5, lines 28-68).

Tang et al discloses Co-Mo system catalyst supported over a TiO₂-containing carrier for the conversion of carbon monoxide with steam into carbon dioxide and hydrogen (see column 1, lines 9-18) and said catalyst comprises a carrier having TiO₂, at least one catalytically active metal compounds selected from the group consisting of oxides and sulfides of Co, Ni, Mo, and W, and optionally promoters selected from the

groups consisting of compounds of rare earth element, alkali earth metals, Cu, Zn, and Mn (see column 2, lines 24-39).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the teachings of Borsboom et al with the teachings of Tang et al such that said O₂ removal catalyst is a TiO₂ catalyst carrying NiO in order to improve the conversion of carbon monoxide with steam into carbon dioxide and hydrogen.

In addition, Forg et al discloses a gas mixture is brought into contact with a catalyst which decomposes HCN by hydrogenation and/or by hydrolysis and COS that is contained in the gas mixture is decomposed at least partially in a catalyst by hydrolysis (see Abstract), a TiO₂ catalyst carrying Cr₂O₃ or NiO (see column 2, lines 32 through column 3, line 5), and simultaneously at least a large part of the COS that is contained in the gas mixture is reacted by hydrolysis, and at the same time the new formation of COS from H₂S and CO₂ is suppressed (see column 2, lines 42-48).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the combined teachings of Borsboom et al and Tang et al such that said O₂ removal catalyst is a TiO₂ catalyst carrying Cr₂O₃ in order that the catalyst system may be used for the decomposition of HCN by hydrogenation and/or hydrolysis and COS is decomposed at least partially by hydrolysis.

Regarding claim 8, Borsboom et al discloses a COS treatment wherein said removing O₂ from the gas is performed at a higher temperature with respect to said converting COS to H₂S (see column 2, lines 39-55).

Regarding claim 9, Borsboom et al discloses a COS treatment apparatus for a gasified gas containing H₂S, H₂O, O₂, and CO, comprising: a reactor (12) into which the gasified gas is to be introduced, the reactor comprising an O₂ removal catalyst for accelerating the following reaction:



Borsboom et al does not discloses the reactor comprising a TiO₂ catalyst carrying Cr₂O₃ and BaO, wherein the TiO₂ catalyst carrying Cr₂O₃ and BaO is an O₂ removal catalyst and wherein the TiO₂ catalyst carrying Cr₂O₃ and BaO is a COS conversion catalyst.

However, Borsboom et al discloses that the oxygen removal catalyst is Co-Mo catalyst (see column 5, lines 28-68).

Tang et al discloses Co-Mo system catalyst supported over a TiO₂-containing carrier for the conversion of carbon monoxide with steam into carbon dioxide and hydrogen (see column 1, lines 9-18) and said catalyst comprises a carrier having TiO₂, at least one catalytically active metal compounds selected from the group consisting of oxides and sulfides of Co, Ni, Mo, and W, and optionally promoters selected from the groups consisting of compounds of rare earth element, alkali earth metals which includes barium, Cu, Zn, and Mn (see column 2, lines 24-39).

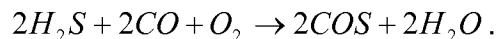
It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the teachings of Borsboom et al with the teachings of Tang et al such that said O₂ removal catalyst is a TiO₂ catalyst carrying the Co-Mo

catalyst in order to improve the conversion of carbon monoxide with steam into carbon dioxide and hydrogen.

In addition, Forg et al discloses a gas mixture is brought into contact with a catalyst which decomposes HCN by hydrogenation and/or by hydrolysis and COS that is contained in the gas mixture is decomposed at least partially in a catalyst by hydrolysis (see Abstract), a TiO_2 catalyst carrying Cr_2O_3 or NiO (see column 2, lines 32 through column 3, line 5), and simultaneously at least a large part of the COS that is contained in the gas mixture is reacted by hydrolysis, and at the same time the new formation of COS from H_2S and CO_2 is suppressed (see column 2, lines 42-48).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the combined teachings of Borsboom et al and Tang et al such that the reactor comprising a TiO_2 catalyst carrying Cr_2O_3 and BaO , wherein the TiO_2 catalyst carrying Cr_2O_3 and BaO is an O_2 removal catalyst and wherein the TiO_2 catalyst carrying Cr_2O_3 and BaO is a COS conversion catalyst in order that the catalyst system may be used for the decomposition of HCN by hydrogenation and/or hydrolysis and COS is decomposed at least partially by hydrolysis.

Regarding claim 10, Borsboom et al discloses a COS treatment method for a gasified gas containing H_2S , H_2O , O_2 , and CO , which comprises a first step of removing O_2 and SO_2 to form steam and H_2S , and a second step which catalyses the hydrolysis with steam of COS and CS_2 to form carbon dioxide and H_2S (see Abstract; figure 1; column 2, lines 39-55; and column 5, lines 28-68), which is capable of accelerating the following reaction:



Borsboom et al does not disclose removing O₂ from the gas by using a TiO₂ catalyst carrying Cr₂O₃ and BaO and simultaneously converting COS to H₂S by using the TiO₂ catalyst carrying Cr₂O₃ and BaO.

However, Borsboom et al discloses that the oxygen removal catalyst is Co-Mo catalyst (see column 5, lines 28-68).

Tang et al discloses Co-Mo system catalyst supported over a TiO₂-containing carrier for the conversion of carbon monoxide with steam into carbon dioxide and hydrogen (see column 1, lines 9-18) and said catalyst comprises a carrier having TiO₂, at least one catalytically active metal compounds selected from the group consisting of oxides and sulfides of Co, Ni, Mo, and W, and optionally promoters selected from the groups consisting of compounds of rare earth element, alkali earth metals which includes barium, Cu, Zn, and Mn (see column 2, lines 24-39).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the teachings of Borsboom et al with the teachings of Tang et al such that said O₂ removal catalyst is a TiO₂ catalyst carrying the Co-Mo catalyst in order to improve the conversion of carbon monoxide with steam into carbon dioxide and hydrogen.

In addition, Forg et al discloses a gas mixture is brought into contact with a catalyst which decomposes HCN by hydrogenation and/or by hydrolysis and COS that is contained in the gas mixture is decomposed at least partially in a catalyst by

hydrolysis (see Abstract), a TiO_2 catalyst carrying Cr_2O_3 or NiO (see column 2, lines 32 through column 3, line 5), and simultaneously at least a large part of the COS that is contained in the gas mixture is reacted by hydrolysis, and at the same time the new formation of COS from H_2S and CO_2 is suppressed (see column 2, lines 42-48).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the combined teachings of Borsboom et al and Tang et al such that removing O_2 from the gas by using a TiO_2 catalyst carrying Cr_2O_3 and BaO and simultaneously converting COS to H_2S by using the TiO_2 catalyst carrying Cr_2O_3 and BaO in order that the catalyst system may be used for the decomposition of HCN by hydrogenation and/or hydrolysis and COS is decomposed at least partially by hydrolysis.

Response to Arguments

Applicant's arguments with respect to claims 1, 4-5, and 8-10 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. See Kaizik et al (US 5,993,763) and Engelbrecht et al (US 4,320,100).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NATASHA YOUNG whose telephone number is (571)270-3163. The examiner can normally be reached on Mon-Thurs 7:30am-6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Walter Griffin can be reached on 571-272-1447. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/NY/

/Walter D. Griffin/
Supervisory Patent Examiner, Art Unit 1797